

# Calculus 1 IBDPE Midterm 2 Info

## Time and Location

Friday, December 26, 09:10-10:00 at D.A.E. 5825 (for Even student ID number) and D.A.E. 5824 (for Odd student IP number).

## Homework 13

Homework 13 will be due on December 26 as well. Solutions will be posted on December 24 for you to check your answers – please use it wisely.

## Ground Rules

- Closed book. No notes. No calculator. The only allowed items on your desk are pen/pencil, erasers/whiteout, and ruler. No food is allowed. Coffee or beverage is allowed, although discouraged.
- Please use the bathroom before the exam. If you absolutely have to go to bathroom during the exam, you need to go to the designated ones that we have inspected before the exam. You also need to verify to me that your pockets are empty before you go.
- No hat nor sunglasses may be worn unless required by medical condition.
- ABSOLUTELY no electronic device may be turned on during the exam. Any voice from cellular phone is considered cheating.
- Makeup exam is only possible when a student is absent due to university official duties.
- Regrade: please see the syllabus for regrade policy.

## Tools

Only writing tools are allowed during this exam.

## Format

There will be six equally weighted problems. You will choose four problems to answer and indicate which four problems to be graded. Problems not indicated for grading will be ignored.

## Topics to Cover

This exam explicitly covers materials from the lecture immediately after the first midterm to December 24. However, basic knowledge from the first midterm such as the computation of limit and differentiations are also assumed. Specifically,

- *Applications of Differentiations:* You should be able to sketch relatively simple curves showing complete work process. That is, you should be able to completely characterize the geometric behaviors of the curve in determined by its first and second derivatives and asymptotic behaviors. Max-min problems will be roughly as difficult as average homework problems. Basic geometric and algebraic knowledge is assumed when setting up the model functions. You should know the definition of differentials, although you will not be required to perform overly tedious computations on them. You do NOT need to study Newton-Raphson approximations. Knowledge from 4.1~4.4, 4.6, will not be explicitly tested but will be needed to solve problems from this chapter.
- *Integration:* You should know the basic definition of integration, although you will not be asked to actually compute the limit of upper and lower sums. You should be able to compute basic integration mentioned in classes and occurred in your homework assignments including ones requiring u-substitutions. You should be able to manipulate the fundamental theorem of calculus and take derivatives of integrals with functions on lower and upper limits. You should be very familiar with basic properties introduced in class and be able to apply them to prove some straightforward facts. You should be able to recover a function given its derivative to some order. You should also be able to compute area between curves given by functions of x or y. You do NOT need to study the mean value theorem of integral.
- *Applications of Integration:* You should be able to compute volume of solids of the three types introduced in class: with explicitly described cross sections, solids formed by revolutions with disc-like cross sections, and shell-like cross sections.
- *Transcendental Functions:* You should know the basic definition of one-to-one functions and compute their inverses. When applicable, you should be able to compute the derivatives of inverse functions. You should be very familiar with the definitions, properties, and graphs of functions  $\ln x$  and  $e^x$  and their integrations and differentiations. Integrations of the difficulties roughly similar to problems 1~52 of section 7.4 should be expected on the exam.

### **Study Suggestions**

- Get enough sleep the night before the exam.
- Practice homework problems THOROUGHLY and be able to appreciate the insight of the problems so that you can do those problems in any forms and with moderate variations. Exam problems are modelled on homework problems.
- This exam emphasizes on conceptual understanding rather than mechanical computations. If you are stuck in long computations, it is recommended to rethink your process and see if you are forgetting some part of the concepts.